WHAT IS CLAIMED IS:

1. A method of estimating the noise floor of a wideband analogue signal comprising the steps:

a. representing the continuous signal as a series of discrete frequency and amplitude values;

b. creating a histogram based on the discrete frequency and amplitude values;

c. deriving a noise floor estimate from characteristics of the histogram.

2. The noise floor estimation method of claim 1 wherein the method of obtaining the series of discrete frequency and amplitude values includes the steps of:

a. sampling a received wideband signal by a plurality of analogue-to-digital converters to generate a series of output signals;

b. windowing the output signals of the analogue-to-digital converters;

c. applying a mathematical transform to the results of the windowing to obtain a series of discrete frequency values;

d. converting an amplitude of each discrete frequency value to log-domain representation; and

e. rounding the log-domain representation of the amplitude for each discrete frequency value to the nearest integer value to generate a discrete amplitude value.

3. The noise floor estimation method of claim 2 wherein the windowing process includes the steps of:

a. selecting a discrete valued weighting function;

b. multiplying the value of each output signal of the series by a corresponding element of the discrete weighting function.

4. The noise floor estimation method of claim 2 wherein the mathematical transform used is a Fast Fourier Transform.

5. The noise floor estimation method of claim 2 wherein the amplitude of each value of the discrete frequency series is converted to log domain representation by multiplying 20 by the base 10 logarithm of the magnitude of the element.

6. The noise floor estimation method of claim 2 wherein the log domain representation of the amplitudes results in the amplitudes being expressed as decibel (dB) values.

7. The noise floor estimation method of claim 2 wherein the log domain representation of the amplitudes results in the amplitudes being expressed as decibel milliwatt (dBm) values.

8. The noise floor estimation method of claim 1 wherein the method of building the histogram based on the discrete frequency and amplitude values includes the steps of:

a. establishing a lowest bin representing the lowest integer dB value of the discrete series representing the wideband signal;

b. establishing a highest bin representing the highest integer dB value of the discrete series representing the wideband signal;

c. establishing bins for each integer dB value between the lowest and highest bins;

d. incrementing the value of each bin when a segment of the series representing the wideband signal crosses the bin with a positive slope.

9. The noise floor estimation method of claim 1 wherein the step of deriving the noise floor estimate from the characteristics of the histogram includes the steps of:

a. defining the lowest dB bin as a starting point

b. determining the next lowest valued local maximum on the histogram;

c. performing a Y test;

d. repeating steps b and c until the Y test fails;

e. setting the noise floor by adding an offset to the dB value of the maximum of the histogram that caused the Y test failure.

10. The noise floor estimation method of claim 9 wherein the Y test includes the steps of:

a. examining all points in the next Y dB;

b. considering the test a pass when a point exists in the next Y dB which has a higher value than the starting point;

c. considering the test a fail when no point exists in the next Y dB which has a higher value than the starting point.

11. The noise floor estimation method of claim 10, wherein Y is 3 dB.

12. The noise floor estimation method of claim 9, wherein the offset is determined based on observed characteristics of the signal and the windowing process' discrete weighting function.

13. The noise floor estimation method of claim 12, wherein the offset is selected from the group of 2 dB for a rectangular window, 2.75 dB for a Hanning window, 3 dB for a Blackman window, and 3.2 dB for a flat top window.

14. The noise floor estimation method of claim 1, wherein the step of creating the histogram includes the steps of:

a. establishing a lowest bin representing the lowest integer dB value of the discrete series representing the wideband signal;

b. establishing a highest bin representing the highest integer dB value of the discrete series representing the wideband signal;

c. establishing bins for each integer dB value between the lowest and highest bins so that there are a total of MK bins;

d. incrementing the bins for each time an element in the discrete series falls into the bin.

15. The noise floor estimation method of claim 14, wherein the step of deriving the noise floor estimate from the characteristics of the histogram includes the steps of:

a. sorting the elements of the histogram in decreasing order of amplitude to create a sorted vector;

b. reducing the size of the sorted linear vector from MK to M by summing groups of K consecutive elements of the sorted linear vector for achieving a more discretised amplitude representation;

c. applying one of a log-likelihood function, and a quasi log-likelihood function, to the M elements of the sorted linear vector to achieve a discrete function $L(k)$;

d. subtracting $L(k)$ from a multiple (C) of a discrete penalty function $p(k)$ to obtain the function $-L(k)+C\,p(k)$;

e. identifying the index, denoted by q_{NF}, at which the minimum of the $-L(k)+C\,p(k)$ equation is achieved; and

f. computing the noise floor level estimate per FFT bin by dividing the mean of the $M-q_{NF}-1$ smallest values of the M sorted vector by K.

16. The noise floor estimation method of claim 15, wherein M is considerably larger than K.

17. The noise floor estimation method of claim 16, wherein M = 64.

18. The noise floor estimation method of claim 16, wherein K=8.

19. The noise floor estimation method of claim 15 wherein $L(k)$ is represented by the quasi-log-likelihood function $L(k) = K \ln\left[\frac{\prod_{i=k+1}^{M} l_i}{\left(\frac{1}{M-k}\sum_{i=k+1}^{M} l_i\right)^{M-k}}\right]$, where k is the index of the function.

20. The noise floor estimation method of claim 15, wherein the penalty function is a polynomial.

21. The noise floor estimation method of claim 15, wherein the penalty function is represented by the second order polynomial function

$$p(k) = \left[3.76\left(\frac{M-1-k}{M-1}\right)^2 + 1.43\left(\frac{M-1-k}{M-1}\right)\right]MK.$$

22. The noise floor estimation method of claim 15, wherein the constant C is -2.6.

23. A wideband analogue signal noise floor estimation apparatus comprising:

a. a digitizer module for creating a representation of the continuous signal comprised of discrete frequency and amplitude values;

b. a histogram module for generating a histogram based on the discrete frequency and amplitude values;

c. an estimation module for deriving an estimate of the noise floor of the wideband signal based on the characteristics of the histogram.

24. The noise floor estimation apparatus of claim 23, wherein the digitizer module further comprises:

a. a sampling module including a plurality of analogue-to-digital converters for generating a series of output signals;

b. a windowing module for weighing the output signals of the sampling element to generate weighed output signals;

c. a transforming module for applying a mathematical transform to the weighed output signals to create a signal comprised of discrete frequency values that represent the original signal;

d. an amplitude domain converter for converting the linear amplitude values to log-domain representation; and

e. an amplitude discretizing module for representing the output of the amplitude domain conversion element as a sequence of integer valued amplitude levels.

25. The noise floor estimation apparatus of claim 24, wherein the windowing module further includes a weighting element for multiplying each value of the output series by a corresponding element of a preselected discrete valued weighting function.

26. The noise floor estimation apparatus of claim 24, wherein the transforming module applies a Fast Fourier Transform.

27. The noise floor estimation apparatus of claim 24, wherein the amplitude discretizing module is constructed to convert each amplitude value of the discrete frequency series to 20 times base 10 logarithm of the magnitude of the value.

28. The noise floor estimation apparatus of claim 24, wherein the amplitude domain converter outputs amplitude values as decibel (dB) values.

29. The noise floor estimation apparatus of claim 24, wherein the amplitude domain converter outputs amplitude values as decibel milliwatt (dBm) values.

30. The noise floor estimation apparatus of claim 23, wherein the histogram module further includes

a. a low bin establishing element for creating a low valued bin to represent the lowest integer dB value of the discrete series representing the wideband signal;

b. a high bin establishing element for creating a high valued bin to represent the highest integer dB value of the discrete series representing the wideband signal;

c. a tertiary bin creation element for creating a bin for each integer dB value between the lowest and highest bins; and

d. a bin count incrementing element for incrementing the value of each bin when a segment of the series representing the wideband signal crosses the bin with a positive slope.

31. The noise floor estimation apparatus of claim 23, wherein the estimation module further includes:

a. a maxima finding element for finding the next left most maximum from a given starting point, that in the absence of previous data takes the lowest dB bin as a starting point;

b. a Y test element for performing a Y test;

c. a decision element for calling upon the maxima finding element until the Y test element reports a fail; and

d. a noise floor setting element for providing a noise floor estimate by adding an offset to the dB value reported by the maxima finding element that caused the Y test element to report a fail.

32. The noise floor estimation apparatus of claim 31, wherein the Y test element further includes:

a. an examination element for searching the Y dB to the right of the given starting point for a value higher than the starting point; and

b. a reporting element for reporting a fail when no point exists in the next Y dB that has a higher value than the starting point and reports a pass if there is a value in the next Y dB that is greater in value than the starting point.

33. The noise floor estimation apparatus of claim 32, wherein Y is set at 3 dB.

34. The noise floor estimation apparatus of claim 31, wherein the offset used by the noise floor setting element is based on observed characteristics of the signal and the windowing process' discrete weighting function.

35. The noise floor estimation apparatus of claim 34, wherein the offset is selected from the group of 2 dB for a rectangular window, 2.75 dB for a Hanning window, 3 dB for a Blackman window, and 3.2 dB for a flat top window.

36. The noise floor estimation apparatus of claim 23, wherein the histogram module further includes:

a. a low bin establishing element for creating a low valued bin to represent the lowest integer dB value of the discrete series representing the wideband signal;

b. a high bin establishing element for creating a high valued bin to represent the highest integer dB value of the discrete series representing the wideband signal;

c. a tertiary bin creation element for creating bins for each integer dB value between the lowest and highest bins; and

d. a bin count incrementing element for incrementing the value of a bin for each time an element in the discrete series falls into the bin.

37. The noise floor estimation apparatus of claim 23, wherein the estimation module further includes:

a. a sorting element for creating a vector containing the discrete amplitudes of the input signal in decreasing order;

b. a vector size reducing element for reducing the size of the sorted linear vector from MK elements to M elements by summing groups of K consecutive elements of the sorted linear vector to achieve a more discretised amplitude representation;

c. a log-likelihood element for applying a log-likelihood, or a quasi log-likelihood function, to the M elements of the sorted linear vector output from the vector reducing element to achieve a discrete function $L(k)$;

d. a penalty function element for subtracting the discrete function $L(k)$ from a multiple (C) of a discrete penalty function $p(k)$ to obtain the function $-L(k)+C\,p(k)$ (PLLM function);

e. an index identification element for identifying the index at which the minimum of the PLLM function, $-L(k)+C\,p(k)$, is achieved and identifying the index, denoted by q_{NF}, at which the minimum of the $-L(k)+C\,p(k)$ equation is achieved; and

f. a noise floor setting element for providing a noise floor estimate by dividing the mean of the $M-q_{NF}-1$ smallest values of the M sorted vector by K.

38. The noise floor estimation apparatus of claim 37, wherein the penalty function element is constructed to apply a polynomial as the penalty function.

39. The noise floor estimation apparatus of claim 37, wherein the penalty function element is constructed to apply the second order polynomial function $p(k)=\left[3.76\left(\frac{M-1-k}{M-1}\right)^2+1.43\left(\frac{M-1-k}{M-1}\right)\right]MK$ as the penalty function.